Section 9
Water Supply Reliability

Under the Act, every UWMP must include an assessment of the reliability of water supply reliability. The water supply and demand assessment must compare the total projected water use with the expected water supply over the next 20 years in 5-year increments. This reliability assessment is required for normal, single dry-year and multiple dry water years. The assessment contained in the 2010 Plan projects reliability through the next 25 years. In addition to the expected, verifiable mix of resources utilized in the reliability assessment, additional planned resources, which have not yet achieved the same level of certainty, have also been identified by the Water Authority and its member agencies. This section presents a summary of the water demands and supplies within the Water Authority's service area along with the reliability assessment and discussion on additional planned supplies.

9.1 Development of Projected Water Resources Mix

In summary, development of the projected mix of resources to meet future demands is based on the following factors:

I. Local agency information on projected water recycling, groundwater, and surface water (discussed in Section 5);

II. Retail compliance with SBX7-7 conservation targets (Section 2)

III. Board approvals taken in regard to continued supply availability:

   a. Adoption of Water Authority's 2008 Strategic Plan with Key Result Area 1 – Water Supply Diversification

   b. Agreement between IID and the Water Authority for Transfer of Conserved Water, and other related agreements (Section 4.1);

   c. Allow the agreement related to the ACC and CC Lining Projects, and other related agreements (Section 4.2);

   d. A water supply contract consistent with the Term Sheet between Poseidon Resources and the Water Authority regarding development of a regional seawater desalination plant located in Carlsbad, CA (Section 4.3);

   e. Inclusion of the San Vicente Dam Raise and Carryover Storage Project in Water Authority's CIP (Section 11.2.3); and

   f. Agreements and actions related to out-of-region groundwater banking program.

9.2 Normal Water Year Assessment

Table 9-1 shows the normal year assessment, summarizing the total water demands for the Water Authority through the year 2035 along with the supplies necessary to meet demands under normal

conditions. Section 2 contains a discussion of the normal year water demands in the Water Authority's service area. If Metropolitan, the Water Authority and member agency supplies are developed as planned, along with achievement of the SBX7-7 retail conservation target, no shortages are anticipated within the Water Authority's service area in a normal year through 2035. As part of preparation of their 2010 Plan, Metropolitan staff identified the Water Authority's demands on Metropolitan, which are shown to be adequate to cover the supplemental need identified in Table 9.1. The member agency level data was not included in their 2010 Plan, but provided by Metropolitan to their member agencies separately and the Water Authority's data is included in Appendix I.

Table 9-1. Normal Water Year Supply and Demand Assessment (AF/YR)[1]

	2015	2020	2025	2030	2035
Water Authority Supplies					
IID Water Transfer	100,000	190,000	200,000	200,000	200,000
ACC and CC Lining Projects	80,200	80,200	80,200	80,200	80,200
Proposed Regional Seawater Desalination	0	56,000	56,000	56,000	56,000
Sub-Total	180,200	326,200	336,200	336,200	336,200
Member Agency Supplies					
Surface Water	48,206	47,940	47,878	47,542	47,289
Water Recycling	38,660	43,728	46,603	48,278	49,998
Groundwater	11,710	11,100	12,100	12,840	12,840
Groundwater Recovery	10,320	15,520	15,520	15,520	15,520
Sub-Total	108,896	118,288	122,101	124,180	125,647
Metropolitan Water District Supplies	358,189	230,601	259,694	293,239	323,838
Total Projected Supplies	**647,285**	**675,089**	**717,995**	**753,619**	**785,685**
Total Demands w/ SBX7-7 Conservation	647,285	675,089	717,995	753,619	785,685

[1] Normal water year demands based on 1960 – 2008 hydrologies.

9.3 Dry Water Year Assessment

In addition to a normal water year assessment, the Act requires an assessment to compare supply and demands under single dry and multiple dry water years over the next 20 years, in five-year increments. Section 2 describes the derivation of the dry water year demands. Table 9-2 shows the single dry-year assessment. The projected groundwater and surface water yields shown in the table are based on historic 1990 supplies during the 1987-1992 drought years. The supplies available from projected recycling and groundwater recovery projects are assumed to experience little, if any, reduction in a dry-year. The Water Authority's existing and planned supplies from the IID transfer, canal lining projects, and seawater desalination are also considered "drought-proof" supplies as discussed in Section 4. For this single dry-year assessment, it was assumed that Metropolitan would have adequate supplies in storage and would not be allocating supplies. With the previous years leading up to the single dry-year being wet or average hydrologic conditions, Metropolitan should

have adequate supplies in storage to cover potential shortfalls in core supplies and would not need to allocate.

Table 9-2. Single Dry Water Year Supply and Demand Assessment Five Year Increments (AF/YR)

	2015	2020	2025	2030	2035
Water Authority Supplies					
IID Water Transfer	100,000	190,000	200,000	200,000	200,000
ACC and CC Lining Projects	80,200	80,200	80,200	80,200	80,200
Proposed Regional Seawater Desalination	0	56,000	56,000	56,000	56,000
Sub-Total	**180,200**	**326,200**	**336,200**	**336,200**	**336,200**
Member Agency Supplies					
Surface Water	17,932	17,932	17,932	17,932	17,932
Water Recycling	38,660	43,728	46,603	48,278	49,998
Groundwater	9,977	9,977	9,977	9,977	9,977
Groundwater Recovery	10,320	15,520	15,520	15,520	15,520
Sub-Total	**76,889**	**87,157**	**90,032**	**91,707**	**93,427**
Metropolitan Supplies	**430,431**	**305,101**	**338,501**	**376,023**	**409,389**
Total Projected Supplies	**687,520**	**718,458**	**764,733**	**803,930**	**839,016**
Total Demands w/ SBX7-7 Conservation	687,520	718,458	764,733	803,930	839,016

If Metropolitan, the Water Authority and member agency supplies are developed as planned, along with achievement of the SBX7-7 retail conservation target, no shortages are anticipated within the Water Authority's service area in a single dry-year through 2035.

In accordance with the Act, Tables 9-3, 9-4, 9-5, 9-6, and 9-7 show the multiple dry water year assessments in five-year increments. The member agencies' surface and groundwater yields shown in these tables are reflective of supplies available during the 1987-92 drought, in years 1990, 1991 and 1992. The Water Authority supplies consist of yield from the IID transfer, canal lining projects, and Carlsbad Seawater Desalination project.

For the multi dry-year reliability analysis, the conservative planning assumption is that Metropolitan will be allocating supplies to its member agencies. By assuming allocations in this reliability assessment, it allows the Water Authority to analyze how storage supplies could be utilized and the likelihood of shortages. Currently Metropolitan allocates supplies through its Water Supply Allocation Plan. Because it is uncertain in the future how Metropolitan will allocate supplies to its member agencies, the analysis in the tables assumes they are allocated based on preferential right to Metropolitan supplies. As discussed in Section 6.1.1, Section 135, Preferential Right to Purchase Water, is included in Metropolitan's Act and allows a Metropolitan member agency to acquire for use within the agency supplies based on preferential rights at any time.

Table 9-3. Multiple Dry Water Year Supply and Demand Assessment Five-Year Increments (AF/YR) – 2011–2013

	2012	2013	2014
Member Agency Supplies	69,597	84,440	103,907
Water Authority Supplies	170,200	180,200	180,200
Metropolitan Allocation (Preferential Right)	317,760	319,177	320,456
Total Estimated Core Supplies w/o Storage Takes	557,557	583,817	604,563
Total Demands w/ SBX7-7 Conservation	658,381	679,509	711,241
Potential Supply (Shortage) or Surplus *(Difference between Supplies and Demands)*	(100,824)	(95,692)	(106,678)
Utilization Carryover Supplies	40,000	40,000	30,000
Total Projected Core Supplies w/ Utilization of Carryover Storage Supplies	597,557	623,817	634,563
Remaining Potential Surplus Supply, or (Shortage) that will be handled through Management Actions	(60,824)	(55,692)	(76,678)

Table 9-4. Multiple Dry Water Year Supply and Demand Assessment Five-Year Increments (AF/YR) – 2016–2018

	2016	2017	2018
Member Agency Supplies	78,943	93,408	112,499
Water Authority Supplies	236,200	236,200	266,200
Metropolitan Allocation (Preferential Right)	322,661	323,350	324,100
Total Estimated Core Supplies w/o Storage Takes	637,804	652,958	702,799
Total Demands w/ SBX7-7 Conservation	682,338	705,461	740,326
Potential Supply (Shortage) or Surplus *(Difference between Supplies and Demands)*	(44,534)	(52,503)	(37,527)
Utilization Carryover Supplies	44,534	40,000	30,000
Total Projected Core Supplies w/ Utilization of Carryover Storage Supplies	682,338	692,958	732,799
Remaining Potential Surplus Supply, or (Shortage) that will be handled through Management Actions	0	(12,503)	(7,527)

Table 9-5. Multiple Dry Water Year Supply and Demand Assessment Five-Year Increments (AF/YR) – 2021–2023

	2021	2022	2023
Member Agency Supplies	87,732	100,719	118,331
Water Authority Supplies	336,200	336,200	336,200
Metropolitan Allocation (Preferential Right)	326,697	327,671	328,695
Total Estimated Core Supplies w/o Storage Takes	750,629	764,590	783,226
Total Demands w/ SBX7-7 Conservation	724,294	751,800	790,177
Potential Supply (Shortage) or Surplus *(Difference between Supplies and Demands)*	26,335	12,790	(6,951)
Utilization Carryover Supplies	0	0	6,951
Total Projected Core Supplies w/ Utilization of Carryover Storage Supplies	750,629	764,590	790,177
Remaining Potential Surplus Supply, or (Shortage) that will be handled through Management Actions	26,335	12,790	0

Table 9-6. Multiple Dry Water Year Supply and Demand Assessment Five-Year Increments (AF/YR) – 2026–2028

	2026	2027	2028
Member Agency Supplies	90,367	103,114	120,486
Water Authority Supplies	336,200	336,200	336,200
Metropolitan Allocation (Preferential Right)	332,058	333,272	334,532
Total Estimated Core Supplies w/o Storage Takes	758,625	772,586	791,218
Total Demands w/ SBX7-7 Conservation	772,892	801,649	844,137
Potential Supply (Shortage) or Surplus *(Difference between Supplies and Demands)*	(14,267)	(29,063)	(52,919)
Utilization Carryover Supplies	14,267	29,063	40,000
Total Projected Core Supplies w/ Utilization of Carryover Storage Supplies	772,892	801,649	831,218
Remaining Potential Surplus Supply, or (Shortage) that will be handled through Management Actions	0	0	(12,919)

Table 9-7. Multiple Dry Water Year Supply and Demand Assessment Five-Year Increments (AF/YR) – 2031–2033

	2031	2032	2033
Member Agency Supplies	92,051	104,807	122,188
Water Authority Supplies	336,200	336,200	336,200
Metropolitan Allocation (Preferential Right)	338,575	340,009	341,486
Total Estimated Core Supplies w/o Storage Takes	766,826	781,016	799,874
Total Demands w/ SBX7-7 Conservation	811,421	842,947	882,795
Potential Supply (Shortage) or Surplus *(Difference between Supplies and Demands)*	(44,595)	(61,931)	(82,921)
Utilization Carryover Supplies	44,595	40,000	30,000
Total Projected Core Supplies w/ Utilization of Carryover Storage Supplies	811,421	821,016	829,874
Remaining Potential Surplus Supply, or (Shortage) that will be Offset through Management Actions	0	(21,931)	(52,921)

The Water Authority's annual preferential right percentage of Metropolitan supplies is estimated through 2035 and total Metropolitan dry-year supplies available for allocation are estimated to be 1,800,000 AF. This total supply assumes reduced deliveries from the State Water Project and Colorado River Aqueduct along with limited storage supplies. For reference, during the fiscal year 2010 allocation period, Metropolitan allocated approximately 1,890,000 AF of supplies to its member agencies.

Under the specific parameters assumed in the multi dry-year analysis, some level of shortage could potentially be experienced, as shown in Tables 9-3, 9-4, 9-5, 9-6, and 9-7. Shortages occur in the early years because the Carlsbad Seawater Desalination project is not yet on-line and the IID transfer supplies have not yet fully ramped up to 200,000AF/YR maximum deliveries. The shortages occurring in the later years are due primarily to increasing water demands due to growth within the region.

As discussed in Section 11.2.3, the Water Authority has invested in carryover storage supply capacity, which can be utilized in dry-years to improve reliability. The carryover storage investment includes both surface water storage in San Vicente Reservoir and out-of-region groundwater storage in California's central valley, for a total of approximately 170,000 AF of storage capacity available by 2012, when the San Vicente Dam raise is scheduled for completion. Once completed, it will take three to five years to fill the reservoir.

As described in Section 11.2.3, there are a number of factors to consider when determining the utilization of carryover supplies to reduce or eliminate shortages. The storage take amount should be handled on a case-by-case basis, considering such items as, current demand trends, core supply availability, hydrologic conditions, and storage supply available for withdrawal. These factors will vary depending upon the situation. For the analysis in the 2010 Plan, it was assumed the carryover storage supplies would be full going into the dry-year period. In determining the amount to utilize, the analysis takes into account the take capacity of the groundwater banking program (approximately 12,000AF/YR) and uses general guidelines that approximately one third of the carryover supplies available in storage will be utilized in one year. Utilizing only a portion of

available storage supplies avoids depletion of storage reserves, thereby making water available for potential ongoing or future shortages. The supplies taken from carryover storage will be considered a Water Authority regional supply to be combined with Water Authority's core supplies and any potential dry-year transfers.

Another factor that will be considered when utilizing carryover supplies is the Special Agricultural Water Rate (SAWR) program requirement that customers in the SAWR class of service receive no water from the Carryover Storage Program during Stage 2 or 3 of the Water Shortage Drought Response Plan. The Water Authority will work with its member agencies to develop a proposed method for administering this program prior to completion of the San Vicente Dam raise. Because the method has yet to be developed, the assessments in Tables 9-3 through 9-7 do not factor in this program requirement.

In years where shortages may still occur, after utilization of carryover storage, additional regional shortage management measures, consistent with the Water Authority's Water Shortage and Drought Response Plan (described in Section 11.2.2), will be taken to fill the supply shortfall. These measures could include securing dry-year transfers, which the Water Authority successfully acquired and utilized during the recent shortage period. (Description of the Water Authority's dry-year transfer program is included in Section 11.2.3.). In addition to dry-year supplies, extraordinary conservation, achieved through voluntary or mandatory water-use restrictions, could also assist in managing shortages. A description of the savings achieved during the 2007-2011 shortage period is described in Section 11.2.1. As discussed in the following section, the amount of savings achieved through extraordinary conservation measures could be limited due to demand hardening, especially following compliance with SBX7-7 conservation savings.

9.3.1 Demand Hardening

It should be emphasized that the amount of extraordinary conservation savings expected to be achieved through mandatory measures, such as water-use restrictions, could be less than that experienced in the 2007-2011 previous shortage periods. This is due to the concept known as demand hardening. Demand hardening diminishes the ability or willingness of a customer to reduce demands during shortages as a result of having implemented long-term conservation measures. Responsiveness to drought pricing and general price increases will diminish because remaining essential uses are less responsive to price. The required reduction levels through SBX7-7 compliance will reduce customer discretionary demands and create less flexibility in the managing of demand during shortages. This will increase the importance of acquiring supplemental dry-year supplies to eliminate or reduce potential supply shortages. Section 11.2.3 discusses the Water Authority's potential dry-year supplies. Long-term permanent conservation savings is critical to ensuring water is used most efficiently and for achieving the SBX7-7 conservation compliance targets. Due to potential demand hardening, resulting from SBX7-7, shortage management measures such as water-use restrictions and drought pricing may not be as effective in the future in achieving necessary savings to help reduce the supply gap.

9.4 Reliability of Supply

The above sections identify the diverse mix of resources planned to meet future demands in both a normal and dry-year. Implementation of this regional resource mix will require development of

projects and programs by the Water Authority, its member agencies, and Metropolitan. The Water Authority coordinated with its member agencies and Metropolitan during preparation of the 2010 Plan on the future demands and supplies projected for the region. The steps being taken by the member agencies and Metropolitan to develop supplies are addressed in their respective urban water management plans. Section 4 contains the steps taken and remaining actions necessary to develop and maintain the Water Authority supplies.

The Act requires agencies to describe reliability of the water supply and vulnerability to seasonal and climatic shortage. Sections 9.2 and 9.3 describes the results of the water supply reliability assessment for the region, during normal water years, single dry years, and multiple dry years. The Act also requires the 2010 Plan to contain historic data on supplies available for the three water year types. The following is the historic total supplies, both local and imported, that were utilized during the periods identified: Normal/average (595,000AF) based on 30-year average between 1979 and 2008, single dry year (645,000AF) based on 1990, and multiple dry water years (645,000AF, 505,000AF, and 541,000AF) based on years 1990-1992. Supplies utilized in a non-allocation dry period could exceed the supplies utilized in a normal year, due to the ability to purchase additional imported supplies from Metropolitan. It should also be noted that in the reliability assessment, contained in Section 9.2, the average local supply yields are not based on historic yields, but projected numbers provided by member agencies. These figures more accurately reflect the expected yield based on current local agency policies and procedures on operations and management of the supply.

Key to long-term reliability will be the monitoring of supplies and demands in order to make necessary modifications to the core and dry-year resources identified in the normal and dry-year resource mixes. The Water Authority Board will monitor reliability of existing supplies and development of identified future supplies through the Annual Supply Report and five year updates to the UWMP.

The Act requires that, for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, that the agency describe, to the extent practicable, plans to replace that source with alternative sources or water demand management measures. As stated throughout the 2010 Plan, the Water Authority and its member agencies are planning to develop a diverse supply of resources. The unavailability of any one supply source will be buffered because of the diversity of the supplies: the region is not reliant on a single source. To replace or supplement an existing supply, the Water Authority could take steps to increase development of transfers or seawater desalination. Member agencies could also further maximize development of recycled water, groundwater, and seawater desalination. In order to adequately plan for potential supply uncertainties and identify alternative sources, the 2010 Plan contains a scenario planning process described in Section 10.

9.5 Additional Planned Supply Projects

The mix of current and future supplies is developed jointly between the Water Authority and its member agencies. The mix of supplies is being represented in two ways. Verifiable supplies are those supplies identified by the Water Authority or member agencies as having achieved a level of certainty in their planning and implementation where California Environmental Quality Act has been satisfied, permits are in hand or contracts have been executed. Verifiable supplies are included

in water supply assessments and verifications prepared by retail water agencies and used by the cities and county in their land use decisions regarding available water supplies for growth under SB 221 and SB 610. Those projects with adequate documentation regarding implementation and supply utilization, or existing projects already planned for expansion, were considered for inclusion in the assessments discussed in Sections 9.2 and 9.3. Additional planned supplies are those that have not yet achieved the same level of certainty as the verifiable supplies, but have progressed to a point where the Water Authority or a member agency has taken significant financial actions to pursue the project.

These additional planned supplies are important to the region for a number of reasons. The Water Authority and member agencies must continue to strive to develop cost-effective local resources that can further diversify the region's supplies and reduce demands for imported water from Metropolitan. They provide objectives for the region to work towards by resolving any funding, regulatory, and other constraints associated with implementation. The additional planned projects are considered potential supply management strategies in the scenario planning process described in Section 10. Figures 9-1, 9-2, and 9-3 show the existing, verifiable, and planned water supplies for recycled water, groundwater, and seawater desalination.

The specific local recycled water and brackish groundwater projects included in the figures are listed in Tables F-2 and F-4, respectively, in **Appendix F**. The total seawater desalination additional planned supplies in 2035 are a combination of Otay Water District's proposed Bi-National Seawater Desalination project (38,600AF/YR) and the Water Authority's proposed Camp Pendleton Seawater Desalination facility (56,000AF/YR). Refer to Sections 4 and 5 for additional information on the derivation of the verifiable and additional planned supply figures.

Figure 9-1
Recycled Water Supply – Existing, Verifiable, and Planned (AF)

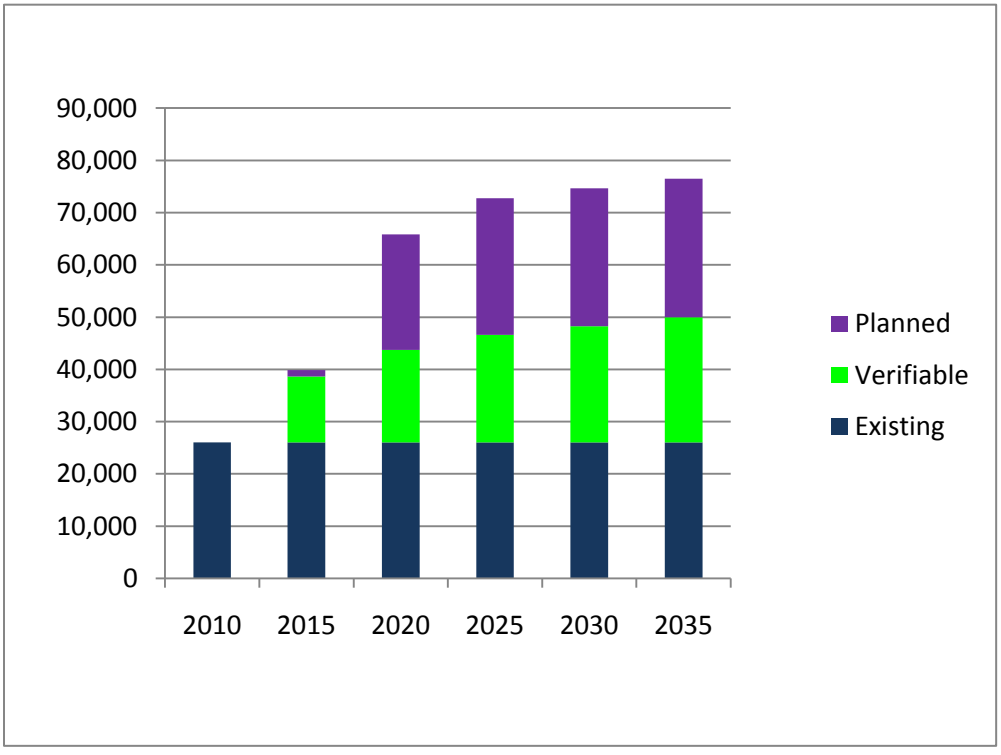

Figure 9-2
Brackish Groundwater Recovery – Existing, Verifiable, and Planned (AF)

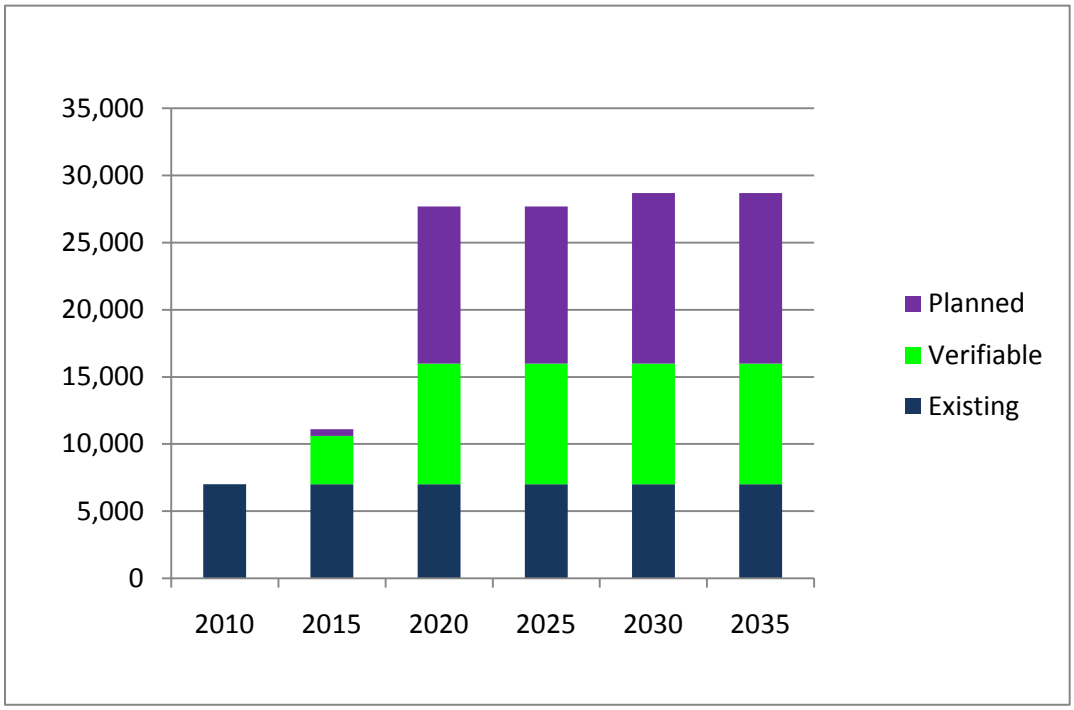

Figure 9-3
Seawater Desalination – Existing, Verifiable, and Planned (AF)